114-TYPE REPERFORATOR-TRANSMITTER MAINTENANCE INSPECTION AND TESTS

1. GENERAL

1.01 This section specifies the procedure for the maintenance of 114-type reperforator-transmitters at a customer's office where complete facilities for routining and testing are not available.

In those installations in which the test-bench facilities are available, it is recommended that these procedures be followed and that check tests similar to those in P35.544 be made after routining.

1.02 The apparatus requirements and adjusting procedures for any particular item which may require adjusting either on a routine inspection or a trouble visit will be found in the section on "Requirements and Procedures", P35.635.

1.03 Studies consistently show that a high percentage of troubles occur shortly after a routine inspection. Some appear to be due to the methods of carrying out the maintenance work. These instructions have been prepared to avoid such troubles and it is important that they be carefully followed.

1.04 The frequency of routine inspections can best be determined locally. Factors to be considered include daily service hours, speed of service and other local conditions. In general, the inspection interval should be the maximum consistent with adequate lubrication.

1.05 The periodic cleaning, lubrication and inspection should be carried out in the order shown. The work should be confined to the items specified except for the correction of any conditions obviously requiring attention. Items which it is felt do not require special attention at each routine are not specified in this section. Also, local experience may indicate the desirability of other changes in the list of items to be checked.

1.06 The materials for carrying out the cleaning and routining are specified in Section P30.010 "Cleaning, General Requirements" and Section P30.301 "Teletypewriter Tools and Maintenance Supplies", with the following exceptions:

(a) For cleaning of contacts, the use of a 374A tool and KS-6528 linen tape may be found to be desirable.

1.07 The lubricants referred to are those specified in Section P30.011 "Lubrication—General Requirements".

2. ROUTINE MAINTENANCE PROCEDURES

2.01 Do all work safely. Do not scatter tools or equipment so as to constitute a hazard. Give special attention to avoiding damage to the customer's property.

(A) Preparation for Routine

2.02 Obtain release of equipment as follows:

(a) Where spare units are not provided, obtain the local customer's permission to routine the apparatus, and wait until any accumulated tape has cleared before removing the unit from service. Advise the test room that a routine inspection is being made and indicate the length of time the customer will be out of service. If unexpected delay is later encountered advise the test room.

(b) Where spare units are provided, wait until any accumulated tape has cleared before removing the unit from service.

2.03 While waiting, observe operation for any abnormal conditions which should be investigated during the routine. Check the tape produced by the unit for clean punching.

2.04 Upon release of unit proceed as follows:

(a) Remove and empty the chad box drawers.

(b) Disconnect the cable from the unit.

(c) Remove the unit from the machine cabinet, exercising care to avoid damaging parts in close proximity to cabinet surfaces, and mount unit on front of base structure, top side up.

(d) Wipe out the cabinet surface to remove oil and dirt.

(B) Routine

2.05 To permit a minimum of handling or shifting of the unit during routine, it is recommended that the cleaning and lubrication be performed on a mechanism by mechanism basis rather than first cleaning the entire unit, then relubricating the entire unit.

2.06 During the inspection observe the condition of the machine but avoid unnecessary dismantling or disturbance of adjustments. In so far as possible operating tests should be used to determine the condition of the machine.

Caution: When it is necessary to make any adjustment, all adjustments that might be affected should be checked and, if necessary, corrected in order to minimize the possibility of subsequent trouble.

(a) Bent, loose or missing parts, binds in parts, elongated springs and parts out of place or obviously out of adjustment should be investigated and corrective action taken, if required. Check all terminal wires of cables for loose connections or broken wires.

(b) Worn parts which experience indicates may cause trouble before the next scheduled inspection should be replaced. Red or rust-colored deposits indicate wear due to lack of lubrication. If on investigation it appears that the parts are not worn sufficiently to require replacement, special care should be taken in lubricating to see that the lubricant reaches the bearing surfaces.

2.07 The procedure suggested for cleaning of contacts throughout the unit is as follows:

(a) Place a piece of lintless cloth such as KS-2423 twill cloth or KS-6528 linen tape over a burnisher such as a 374A tool.

(b) Moisten the cloth with KS-8372 trichloroethylene and pass the cloth back and forth between the contacts.

(c) Repeat the operation using a dry cloth.

(d) Burnish the contacts.

2.08 Cleaning of items other than those listed should not be done unless it appears that dirt which may be present is likely to cause trouble by working into bearing surfaces or being deposited on contacts before the next scheduled inspection.

Before the start of detailed cleaning, loose deposits of dirt or tape lint should be carefully brushed off the mechanisms and surfaces of the unit.

2.09 IN THE FOLLOWING WHERE LUBRICATION IS SPECIFIED, OIL OR GREASE SHOULD BE APPLIED ONLY IF THE PART IN QUESTION DOES NOT HAVE SUFFICIENT LUBRICATION TO CARRY OVER TO THE NEXT REGULAR INSPECTION PERIOD. WHERE LUBRICATION IS REQUIRED, LUBRICANTS SHOULD BE APPLIED SPARINGLY UNLESS OTHER-

WISE SPECIFIED. Excess lubricant may affect operation of contacts or other parts not requiring lubrication, thereby introducing trouble.

In the following list, detailed information on lubrication is not given. The detailed information on items requiring lubrication and the lubrication required on an initial lubrication are given in Part 2 (D). KS-7470 oil should be used for all oil lubrication except where KS-6232 oil is specified.

2.10 Cleaning and Lubrication.

(a) Remove the range-finder and the magnet cover.

(b) Clean the range-finder mechanism and check the adjustments of the mechanism (stop-pawl, trip-latch spring and stop-pawl spring adjustments).

(c) Lubricate the range-finder mechanism. KS-6232 oil.

(d) Clean the selector mounting-plate.

(e) Clean the selector-magnet core and armature assembly using KS bond paper or lintless cloth.

(f) Lubricate the armature lever and selector-arm pivot screws, applying KS-6232 oil sparingly.

(g) Remove the selector cam-sleeve assembly.

(h) Replace friction washers, if necessary.

(i) Lubricate washers—saturate washers with oil and remove excess by pressing washers between two pieces of cloth.

(j) Fill main-shaft cavity with oil.

(k) Reinstall selector cam-sleeve assembly.

(l) Check alignment of selector levers and selector cam-sleeve peaks.

(m) Check magnet-armature pivot-screw adjustment, selector-magnet-bracket positions, selector-arm operating-screw clearance and locking-lever clearance.

(n) Reinstall range finder and selector-magnet cover.

(o) Check trip-off screw adjustment.

(p) Check engagement of range-finder stop-pawl and selector-cam stop-arm.

(q) Check adjustment of main-clutch throw-out lever.

(r) Clean universal contacts and check adjustment of contacts.

(s) Lubricate selector mechanism.

(t) Lubricate main clutch and throw-out lever.

(u) Lubricate receiving-shaft mechanisms.

(v) Remove code punch block.

(w) Remove lint from punch block.

(x) If desired, rinse punch block in clean petroleum spirits.

(y) Lubricate punch block sparingly at following points, using KS-6232 oil; feed-roll bearings and slots in lower ends of punch pins.

(z) Remove code-punch-block tape guide if necessary to facilitate cleaning.

(aa) Wipe out tape passage in guide and clean punch selector fingers and linkages.

(ab) Clean prepunch mechanism.

(ac) Clean prepunch tape guide and tape passage in prepunch block using standard cleaning tool.

(ad) Lubricate prepunch mechanism.

(ae) Lubricate selector fingers at ends which engage punch pins and at all bearing points.

(af) Reinstall punch block and tape guide. Lubricate detent star wheel and other parts requiring lubrication.

(ag) Check punch selector finger—code punch pin alignment.

(ah) Remove sensing contact guard.

(ai) Clean transmitter yoke and lid, transmitter mechanism and linkages between sensing pins and sensing contacts.

(aj) Clean sensing contacts where necessary. Check that springs are not easily shifted sidewise.

(ak) Check sensing contact spring pileups for contact alignment and "make and follow adjustments".

(al) Check continuity of sensing contacts for FIGS, LTRS and H as follows:

(1) Set up FIGS manually in the sensing contacts and check for continuity without perceptible resistance between terminals 13 and 33 of the Jones plug on the base.

(2) Repeat, with LTRS combination and terminals 14 and 33.

(3) Repeat, with H combination and terminals 12 and 33.

(am) Lubricate transmitter mechanism and linkages between sensing pins and sensing contacts. Reinstall sensing contact guard.

(an) Remove guard for sensing magnet. Clean the magnet armature and core. Check connections to magnet coils. Lubricate the mechanism and fill the oil-cup for the rear bearing. Reinstall the guard.

(ao) Place unit bottom-side upward.

(ap) Clean the cavity of the base and wipe out the tape chute between the code punch block and the transmitter mechanism.

(aq) Check sensing-contact pileup screws for tightness. If screws require tightening, recheck adjustments of sensing contacts after tightening.

(ar) Remove one screw holding distributor-contact adjusting-screw bridge to mounting structure. Loosen second screw and shift bridge structure out of position to provide access to contacts.

(as) Clean distributor contacts.

(at) Clean distributor-contact adjusting-screw bridge and put back in place.

(au) Clean distributor cam surfaces and distributor contact operating levers.

(av) Apply oil sparingly to felt lubricators of distributor cam and sensing cam.

(aw) Lubricate sparingly all bearing points of operating levers associated with cams.

(ax) Clean distributor-magnet pole-faces. Check connections to magnet coils.

(ay) Lubricate armature pivot points.

(az) Clean auxiliary contacts, tape-out contacts, transmitter-stop contacts and universal contacts. Check the pileup screws for tightness. Check adjustments of the contacts.

(ba) Fill distributor-shaft rear-bearing oil-cup.

(bb) Apply two to six drops of oil in the sensing and distributor shafts' cavities.

(bc) Apply oil sparingly to sensing and distributor shaft clutches and to detent mechanisms associated with cams.

(bd) Check that the inside surface of prepunch chad tube is clean. If necessary chad tube may be removed for cleaning.

(be) Lubricate all bearing points and gears on underside of base.

(C) Check Tests

2.11 After completion of routine, make the following check tests. The requirements to be met are included for convenience of reference. In the case of any question with respect to requirements the Bell System Practice covering requirements and procedures should be referred to.

(a) Reinstall the unit on the reperforator transmitter base and connect the Jones plug to the reperforator unit.

(b) With the unit sending signals to the test room check character of sent signals. The distortion in the signals should not be more than 3%. To facilitate checking and adjusting the individual contacts the following repeated characters should be sent during this test: BLANK, T, CAR RET, SPACE, LINE FEED and E.

(c) If distorted signals can be supplied locally, or over a line from a distant office, check the receiving margins of the selector in the usual manner. If distorted signals are not available send signals to the selector magnet from a keyboard, reperforator transmitter unit or transmitter distributor meeting the requirement specified in the foregoing test. Determine the orientation range and position the range-finder arm in the middle of the range.

(d) Using miscellaneous text matter, check that the unit operates satisfactorily both sending and receiving. In this test check for correct functioning of the following:

(1) Tape-Out Contacts
(2) Transmitter-Stop Contacts
(3) Tape-Feed-Indicator Contacts
(4) Universal Contacts
(5) Tape-Out Switch

(e) Check alignment of feed holes with respect to code-punch holes.

(1) The center lines of the feed holes and the code-punch holes should coincide. Also the center line of the code-punch holes should be at right angles to the edge of the tape.

(f) Check alignment of the transmitter tape-guide plate and code-punch block.

(1) The right edge of the transmitter tape-guide plate should be parallel to the left edge of the code-punch block and the tape slot of the code-punch block should be in line with the tape passage of the tape-guide plate.

(g) Check adjustment of transmitter tape-guide plate with respect to the code-punch holes.

(1) The transmitter pins should be located approximately centrally with respect to the code-punch holes with the transmitter assembly at the center, extreme right or extreme left of its travel.

(h) Check selector-clutch torque.

2.12 Clean selector-magnet pole-faces.

2.13 Remove excess lubricants and return unit to service.

(D) Detailed Lubrication

2.14 Unless otherwise specified, one or two drops of oil at each place indicated in the following list will be sufficient. Use KS-7470 oil and KS-7471 grease for all lubrication except where KS-6232 oil is specifically called for in the list.

2.15 A small stiff brush, such as the R-2119 brush, may be used to apply grease in a thin film at points where grease is specified.

2.16 New felt washers and wicks, before being used, should be thoroughly saturated with oil and, before assembling, the excess oil should be removed by squeezing the washers or wicks between two pieces of cloth.

2.17 Oil both loops of all helical springs which exert a nominal tension of less than 2-1/2 lb.

2.18 Apply grease to both loops of all helical springs that exert a nominal tension of 2-1/2 lb. or more.

2.19 Selector Mechanism.

NOTE: Be careful not to get oil between the pole faces of the selector magnet and the magnet armature.

(a) Armature lever—two pivot screws.

(b) Selector arm—two pivot screws, two sword contact points, locking tip, and point of contact with operating screw.

(c) Selector-arm detent—bearing and point of contact with selector arm.

(d) Range-finder assembly.

(1) Trip-latch plunger, bearing, and two points of contact.

(2) Bell crank—bearing.

(3) Trip latch—bearing and points of contact.

(4) Stop lever—bearing and point of contact with stop arm.

(e) Swords and selector levers—drop oil between separator plates.

(f) Selector T levers—all points of contact.

(g) Selector-arm locking-lever—at pivot.

(h) Selector cam-sleeve—each cam peak.

(i) Tape feed-out lever—point of contact with trip-latch bell crank.

2.20 Receiving Shaft.

Remove range scale. Remove the cam-sleeve retaining disc (left-hand threads) and fill the shaft with oil.

(a) Locking-lever-cam felt oiler—saturate.
(b) Selector-cam friction washers (2)—saturate.
(c) Eccentric-cam oil-hole—4 drops of oil.
(d) Receiving-shaft ball bearings (2)—grease lower, oil upper.
(e) Clutch-throwout lever—2 bearings, grease end of lever.
(f) Clutch—oil freely.
(g) Receiving-shaft gear—grease.
(h) Compression springs (2)—allow oil to flow into prongs under springs.
(i) Universal-contact operating lever—at bearing and apply a thin film of grease to camming surface.
(j) Reinstall the disc.
(k) Reinstall the range scale.

2.21 Reperforating Mechanism (Code-Punch Bracket).

(a) Punch lever—fill oil-cup for bearing—oil shoulder screws at both ends—saturate felt washer.
(b) Punch-arm link at adjusting-screw extension.
(c) Selector transfer levers—drop oil between separators at both ends and at bearing.
(d) Vertical stop levers—at juncture with selector levers, at bearing shaft, at juncture with punch-selector fingers.
(e) Punch-selector fingers at front guide comb and point of contact with punches.
(f) Punch-bail pilot-screw—2 bearings.
(g) Feed-pawl bearing.
(h) Feed roll—2 bearings.
(i) Feed-roll-detent wheel—grease.
(j) Feed-roll detent—bearing and roller.
(k) Code punches.
(l) Code-punch retracting bail—bearings (2) and points of contact with code punches.
(m) Tape-feed suppressor at bearing—at point of contact with feed pawl.
(n) Locking-bail bearings—(2).

(o) Contact surfaces between locking bail and stop levers—grease.

(p) Locking-bail retractor at points of contact with locking bail—grease.

(q) Tape-depressing bail—bearing.

2.22 Pivoted Transmitter and Transfer Mechanism.

(a) Transmitter lid—bearings (2).

(b) Sensing fingers—bearings, and point of contact with guide plate.

(c) Transmitter yoke—bearings (2).

(d) Tape-feed lever—bearings (2).

(e) Tape-feed-pin lever bearing.

(f) Feed-pin oscillator—bearing and points of contact with feed-pin lever and guide.

(g) Feed-pin-oscillator lever—bearing, and guide comb.

(h) Transfer-selector levers (Y levers)—bearing, and at guide comb 2 places.

(i) Contact lever—bearing.

(j) Transmitter stop-contact operating plunger.

2.23 Transfer and Slide-Lever Mechanism.

(a) T levers—bearings, and at points of contact with selector levers and transfer-slide levers.

(b) T lever operating bail (transfer bail)—bearings (2).

(c) Transfer-slide levers—bearings 2 each.

(d) Contact-operating levers—bearings, and grease at point of contact with transfer-slide levers.

2.24 Sensing Shaft.

(a) Sensing-shaft bearings—ball bearing at right, fill oil-cup at left.

(b) Sensing shaft—remove thumb-screw from right end of shaft and fill shaft with oil.

(c) Sensing-shaft gear—grease.

(d) Clutch assembly—oil freely.

(e) Detent lever at bearing.

(f) Oscillator-lever roller.

(g) T lever operating (transfer) bail roller.

(h) Clutch lever—bearings (2)—grease end.

(i) Thin film of grease on bearing surface of all cams or oil on lubricating wicks.

2.25 Distributor Shaft.

(a) Distributor-shaft bearings—ball bearing at right, fill oil-cup at left. (NOTE: Oil-cup should be set at a 45° angle with open end toward front.)

(b) Distributor shaft. Remove thumb-screw from right end of shaft and fill shaft with oil.

(c) Distributor-shaft gear—grease.

(d) Clutch assembly—oil freely.

(e) Detent lever—bearing.

(f) Clutch contact-operating levers—at bearing and thin film of grease at point of contact with contact insulator.

(g) Clutch lever—bearings (2)—grease end.

(h) Distributor-contact levers—bearing, grease point of contact with cams, thin film of grease on point of contact with contact insulator.

(i) Thin film of grease on bearing surface of all cams or oil on lubricating wicks.

NOTE: Remove all oil and grease from distributor contacts and excess oil from associated parts.

2.26 Sensing and Distributor Cam-Sleeves Detent.

(a) Both loops of the detent-lever springs—(4).

(b) Clutch-detent levers—bearings (2).

(c) Clutch-detent levers—grease engaging surface with cam (2).

(d) Detent cams—thin film of grease (2).

(e) Lubricators—saturate with oil (2).

2.27 Sensing and Distributing Drive Shaft.

(a) Sensing and distributing drive-shaft gears (2)—grease.

(b) Sensing and distributing drive-shaft bearings (2).

2.28 Contact Insulators.

Apply a thin film of grease on the insulators of the following contacts at the point where insulators bear against their operating levers:

(a) Universal contact.

(b) Transmitter-stop contact.

(c) Tape-out contact.

(d) Distributor-shaft clutch-magnet contact.

(e) Clutch-magnet auxiliary contact.

(f) Switching contacts.

NOTE: Remove all excess oil and grease after lubrication and check that all contacts are free from oil, dirt or grease.

2.29 Base (MRXDB1) Main Shaft.

(a) Main-shaft motor gear—grease.

(b) Motor pinion—grease.

(c) Main-shaft ball bearings—grease.

(d) Main-shaft sensing and distributing drive gears—grease.

(e) Receiving-shaft drive gears—grease.

2.30 Lubricate the motor at yearly intervals—tag the motor to indicate the date of lubrication.

Caution: Experience indicates that more trouble is caused by over-lubrication of motor bearings than by under-lubrication. Care should be taken that the bearings are not over-lubricated.

(a) To lubricate a motor bearing, press the grease gun against the ball oiler and force grease into the end bell by pushing on the plunger of the gun. One stroke of the plunger should be sufficient.

2.31 After lubrication has been completed, clean the selector-magnet pole-face and associated armature with a strip of KS bond paper to remove any dirt or lubricant that may be present.

2.32 Connect power to the unit and after it has run for at least 10 minutes, check the tension of the selector cam clutch.